Antimicrobial response in *Anemonia sulcata* (Cnidaria)

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Recently we analyzed the inflammatory response in *Anemonia sulcata,* following injection of various substances, and observed specific reactions especially after injection of bacteria. Moreover, we analyzed enzymatic activity of protease, phosphatase and esterase, showing how the injection of different bacterial strains alters the expression of these enzymes suggesting a correlation between the appearance of the inflammatory reaction and the modification of enzymatic activities. Our study show for the first time in cnidarian, cellular and molecular responses following injection of bacteria.
The sea anemones are a source of neurotoxins acting on potassium and sodium ion channels. *A. sulcata* is exposed to attacks from predators but is unable to retract the tentacles and actively capturing a broad spectrum of prey is subject to frequent breakage of the tentacles with subsequent bacterial infection. The chemical arsenal of *A. sulcata* is the optimal strategy for survival, mainly through the production of neurotoxins and by using antimicrobial molecules.
By acid extraction, HPLC purification and antibacterial assays, we isolated, purified and characterized an antimicrobial peptide towards *Micrococcus lysodeikticus*. The mass spectrometry analysis and the sequencing, showed that antimicrobial peptide is present in the database as neurotoxin, named Neurotoxin 2 (ATX II), Na^+ channel blocking toxin.
ATX II can then be considered as a neurotoxin having antimicrobial peptide structural and functional characteristics.
This multifunctionality could be an optimal survival strategy that allows these animals to be active predators through the production of neurotoxins and to resist to bacterial infections caused eventual rupture of the tentacles through the functionality by antimicrobial peptides.